

# OPTIMIZED INTERNET ADVERTISING USING HISTORY TO SELECT SITES

## Field of the Invention:

The present invention relates to computer networks and more particularly to a system and method for presenting advertisements on the screens of computers that are connected to the Internet.

## Background of the Invention:

As used herein the term viewer refers to an individual who views or looks at a web page using a program such as one of the commercially available web browsers. Co-pending patent application serial number 08/787,979 filed 1/22/97 entitled "Internet Advertising System" describes a system for presenting advertisements to viewers who access web sites on the Internet (i.e. the World Wide Web). The present invention is an improvement to the system shown in the above referenced patent application

The Hyper Text Transfer Protocol (HTTP) and the Hyper Text Mark Up Language (HTML) provide a mechanism whereby one web site can easily link to a remote server.

The HTTP mechanisms for referencing and obtaining material from a remote server is useful in providing advertising material for display to viewers. There are commercially available systems that provide advertising material for web sites from a central server. Various web pages have links to this central server. With such an arrangement, when a viewer accesses a particular web page, a central server provides an advertisement that the viewer sees on the web page.

Using standard HTTP facilities it is possible to track when a particular viewer accesses a web site and thus it is possible to compile a data base which in essence provides a





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1 the view-op were from a viewer who had recently visited a particular web page and one  
2 cent for the same view-op if the viewer had not recently visited the particular web page.  
3 Yet another example of a parameter that could be specified in a proposed bid is the rate  
4 at which viewers "click" on an advertisement to obtain more information about what is  
5 shown in the advertisement. The rate at which viewers "click" on an advertisement to  
6 access another site linked to the advertisement is often referred to as the "click-through  
7 rate". The bidding parameters can be either simple or complex.

8  
9 With the system shown in the co-pending application when a view-op arises, the system  
10 evaluates the characteristics of the view-op compared to the specifications of proposed  
11 bids. Next, the bid selection logic selects the highest bid from the various available bids  
12 and the advertisement that has the highest bid for the particular view-op is displayed.

13  
14 **Summary of the Present Invention:**

15 The present invention is applicable to a system that includes: (a) a web server system  
16 which stores advertisements and data bases, (b) bidding agents which submit bids to  
17 display advertisements in view-ops which have certain specifications, and (c) bid  
18 selection logic which decides which bid to accept for each particular view-op. With the  
19 present invention when a view-op occurs which meets the specifications in a bid, the  
20 view-op is further evaluated in terms of the comparative effectiveness of the particular  
21 advertisements on each of the sites on which the advertisement was previously  
22 displayed. The frequency of the advertisement is increased on sites that have proved  
23 effective and decreased on sites that have a lower effectiveness. The present invention  
24 thus adds an additional parameter that is considered and evaluated on a real time basis  
25 to determine if a particular advertisement should be displayed in response to a particular

view-op. This additional parameter takes into consideration the effectiveness of this particular advertisement on the sites where it was previously displayed.

**Brief Description of the Drawings:**

Figure 1 is a prior art system diagram.

Figures 2A and 2B are flow diagrams of the operations of the prior art system.

Figures 3A and 3B are flow diagrams of the present invention.

**Description of a preferred embodiment:**

The present invention is an improvement on the type of prior art system shown and described in co-pending patent application serial number 08/787,979 filed 1/22/97 and entitled "Internet Advertising System" which is assigned to the same assignee as is the present application. The above referenced co-pending application is hereby incorporated herein by reference in its entirety. In order to explain the principles of the present invention, a simplified overall block diagram of the prior art system is shown in Figures 1 and a simplified block diagram of the operation of the prior art system is shown in Figures 2A and 2B.

After the operation of the overall prior system is described with reference to Figures 1, 2A, and 2B the preferred embodiment of the present invention will be described with reference to Figures 3A and 3B. The present invention relates to an improvement in the bid selection logic 16C that is shown in Figure 1.

The system shown in Figures 1 operates as follows: A human viewer 10 utilizes a client web browser 11 to access a web page 12 on a web site 14. The web page 12 is transmitted to browser 11 in a conventional manner. Web page 12 includes an HTML

reference to a file (i.e. an advertisement) located on an advertising web server system

16. The client web browser 11 has what is known in the art as a "cookie" 11A, which provides information from browser 11 to the web server system 16. The client web browser 11, the cookie 11A, the web site 14 and the web page 12 are all conventional and in widespread use. For example, the client web browser 11 could be one of the commercially available web browsers, for example, the commercially available and widely used web browser marketed by Netscape Communications Corp. under the trademark "Netscape Navigator" or the browser marketed by Microsoft Corporation under the trademark "Internet Explorer". The web site 14 and the web page 12 could be any of the thousands of web sites and web pages which are part of the World Wide Web and which have HTML references to advertisements which are located on a remote server.

Web page 12 includes an HTML reference to an advertisement stored on advertising web server system 16. Each time client web browser 11 displays web page 12, the human viewer 10 will see an advertisement which is provided by advertising web server system 16. Such HTML references are in widespread use and they are implemented using conventional HTML tags. Advertising web server system 16 includes a database of advertisements 16A, a database of viewer information 16B, and bid selection logic 16C. The bid selection logic 16C receives bids from bidding agents 30A to 30Z which in turn receive information concerning proposed bids from bid input system 18. For purposes of illustration only three identical bidding agents 30A, 30B and 30Z are specifically shown. The reference number 30 will be used to refer to a typical bidding agent. It should be understood that the system could include any number of bidding agents. For example, a system could include several thousand bidding agents 30. Bid input system 18 provides bidding agents 30 with proposed bids which specify how much



(3) It compares various bids received from bidding agents 30 in order to determine which advertisement to display. (As explained later, with the present invention, additional information is considered in order to determine which advertisement should be displayed) and

(4) It sends the appropriate advertisement from data base 16A to browser 11.

The operations performed by advertising web server system 16 are shown in Figures 2A and 2B. Figure 2A shows how server system 16 uses the information from cookie 11A to update the database of viewer information 16B to reflect the fact that this particular viewer has accessed this particular web page. The operations proceed as shown by blocks 201 to 203. Block 201 indicates that a viewer has selected web page 12 and that the selected web page has been transmitted to the viewer's browser 11. As indicated by block 202, web page 12 has an HTML reference to a file on server system 16 using conventional HTML techniques. Block 203 indicates that the server 16 then obtains data from cookie 11A to update the database of viewer information 16B.

When a viewer 10 accesses web page 12, which has an HTML reference to server system 16, the system determines which advertisement from database 16A to present to the viewer. The manner in which the system performs these operations is shown by block diagram 2B. For example, one advertiser might have submitted a proposed bid to bidding agent 30A which specified that he is willing to pay five cents for displaying an ad to a viewer who has accessed at least three financial oriented web sites within the last week. Another advertiser might have submitted a proposed bid to bidding agent 30B specifying that he is willing to pay six cents for displaying an advertisement to a viewer

that has accessed at least three financial oriented web sites within the last five days. When a view-op occurs which is initiated by a viewer 10 who has accessed three financial oriented web sites in the last five days, bidding agents 30A and 30B would determine that the particular view-op satisfies the criteria specified by both advertisers. Both bids would be submitted to bid selection logic 16C, and bid selection logic 16C would then select the highest bid, and the advertisement specified by that advertiser would be displayed to the viewer. The criteria specified by the advertisers may be much more complex and involve many more parameters than those given in the simple example specified above. However, notwithstanding the complexity of the proposed bids and the number of parameters specified in each proposed bid, the basic operations performed by bidding agents 30 and by bid selection logic 16C are as illustrated in the above simple example.

As shown in Figure 2B, a cycle of operation begins (block 210) when a viewer 10 selects a web page 12 which has a HTML reference to web server system 16, that is, when a view-op occurs. It is noted that this occurs in real time and it can take place thousands of times per second. Block 211 indicates that the web server system 16 sends information concerning the view-op and related information in the database 16B to the bidding agents 30. The bidding agents 30 compare the information about the view-op to the proposed bids that have been submitted by advertisers. That is, the bidding agents 30 determine if the characteristics of the view-op meet the criteria in the proposed bids and if so they submit bids to bid selection logic 16C (block 213). As shown by block 214, the bid selection logic 16C compares various bids and selects the highest bid and therefore an advertisement for display. The appropriate advertisement called for by the winning bid is then sent from database 16A to browser 11 (block 215).

Block 212 indicates that each advertiser submits proposed bids. Each bid includes various parameters that, for example, specify the type of web page on which the advertiser wants to advertise and an amount, (i.e. the dollar amount) which the advertiser is willing to pay for having a particular advertisement displayed

In order to understand the power of the type of system shown in Figures 1 and 2, it is important to realize that the bidding agents 30 evaluate proposed bids in microseconds, that is, in real time. The rate at which "hits" on web pages occur (i.e. the rate at which viewers access web pages that have HTML reference to server system 16) can be in the order of thousands per second. Thus, the evaluation of proposed bids is performed very quickly in real time. Proposed bids can contain parameters which specify that a proposed bid will in effect change in real time. For example a proposed bid might specify that for the first 1000 matching view-ops, the proposed bid will be five cents and for the next 1000 matching view-ops the proposed bid will be four cents. The actual submission of proposed bids by advertisers and the rate at which advertisers can change their proposed bids is measured in minutes compared to the rate at which the system evaluates proposed bids which is on the order of microseconds.

The operation of the browser 11, the operation of the web server 14, and the manner in which web pages produce HTML references to web server system 16 using the HTTP protocol and HTML mark up language are described in numerous published books such as: "HTML Source Book A Complete Guide to HTML" by IAN S. Graham, published by John Wiley and Sons (ISBN 0 471-11849-4) or "The Internet Complete Reference" by Harley Hahn and Rick Stout, published by Osborne McGraw-Hill, ISBN 0 07-881980-6. Numerous other books are also available which describe the HTTP protocol. Such books describe how a browser, such as 11, can access a web page, such as web page

12, which in turn has an HTML reference to a file (i.e. an advertisement) stored on a server such as advertising server system 16.

The present invention provides an additional parameter that is taken into account in determining which advertisement will be displayed in response to a particular view-op. The additional parameter provided by the present invention is a parameter that is based upon the effectiveness of a particular advertisement on a particular web site in comparison to the effectiveness of this same advertisement on the other web sites where it has been displayed. The following highly structured and simplified example illustrates the operation of the present invention. The operation of the invention as applied to a "real-world" situation will be explained later.

Consider the following situation: an advertiser wants to have an advertisement displayed 10,000 times per day for a 10 day period (that is, 100,000 time) in response to view ops that meet certain criteria.

For this example assume:

- (a) that the advertiser bids ten cents for each of these view-ops.
- (b) that view-ops that meet the specifications in the bid are on average occurring on 1000 sites at a rate of 40 view-ops per day per site.
- (c) that the view-ops occur evenly spaced during the day and that the view ops occur in an even stream from the sites. That is the view-ops occur in an orderly sequence such as site1, site2, site3.....site 1000, site 1, site2, site3, .....site 1000.
- (d) that for the view-ops on 500 of these sites, some other advertiser has a higher bid.

Thus there will be 500 sites, each receiving 40 view-ops per day which fit the ad's criteria and where this advertiser's bid is the highest bid.



1  
2 The selection criteria for sites A is set to 100 percent.

3 The selection criteria for sites B is set to 80 percent

4 The selection criteria for sites C is set to 50 percent

5  
6 The selection criteria for the remaining sites is set to 10 percent in order to continue  
7 gathering data from these sites for future calculations. The percentages of all sites is  
8 chosen so that at the present rate of view-ops, the total view-ops specified in the bid will  
9 be reached in the desired time period.

10  
11 The above calculation is re-made each time a new viewing opportunity is presented.  
12 Thus in the example given above the calculation is made approximately ninety nine  
13 thousand times. It should be noted that sites not used for advertisements as a result of  
14 the calculations made as described above are made available to the next lower bidder  
15 and that in the placement of advertisements on these sites, the process described above  
16 is repeated.

17  
18 It might seem that with the present invention a great deal of calculating is made in order  
19 to determine which advertisement should be placed in response to a view-op. However,  
20 it should be considered that in practice advertisers pay up to a few cents for presenting  
21 particular advertisements on particular sites. With modern day computers the cost of  
22 making the type of calculations required by the present invention are in the range of or  
23 less than mills (i.e. tenths of a cent) rather than cents

24  
25 The present invention optimizes the placement of advertisements, that is,  
26 advertisements are placed on sites where they are most effective. As described above,



advertisement is scheduled for display at least ten thousand times. Thus the initialization period can extend for up to ten percent of the times that an advertisement is displayed. It is however, noted that in practice, most Internet advertisements are displayed many more than 1000 times, thus, the initialization process takes much less than ten percent of the total view-ops. The length of the initialization period is arbitrary, so long as it is long enough to give some valid data to use in the initial calculations.

During the initialization period the results achieved by each advertisement in the form of "click throughs" is evaluated. As previously explained, while the present embodiment utilizes "click throughs" as a measure of the effectiveness of an advertisement in certain situations other measurements could be used. For example, in a situation where an advertisement results in a request for literature, the number of requests for literature could be a measure. Other measures of the effectiveness of advertisements could also be devised.

After the initialization period the process continues as shown in Figure 3B. The series of steps shown in Figure 3B is performed as each view-op that meets a bid's specification becomes available. The steps shown in Figure 3A and 3B will now be explained in detail.

The steps shown in Figure 3A are performed during the initialization period. As indicated by blocks 301, 303 and 305, when a view-op becomes available, its properties are compared to the properties set out in the various bids, and the highest matching bid is selected. Next as indicated by block 307, a determination is made as to whether or not this view-op is needed to meet the schedule set out in the winning bid. If it is not needed, this view op is assigned to the next lower matching bid as indicated by block 309. If it is needed to meet the schedule, a check is made to determine if the

1 initialization period is complete. If the initialization is not complete, the advertisement is  
 2 displayed as indicated by block 312. As indicated by block 315, if the initialization period  
 3 is complete, the process switches to the procedure shown in Figure 3B.

4  
 5 Figure 3B shows the procedure that is followed after the initialization period. Steps 321,  
 6 323, and 325 are identical to the corresponding steps shown in Figure 3A and previously  
 7 explained. Next as indicated by block 331, the system looks at the results achieved at  
 8 each site where an advertisement was previously displayed and the results achieved are  
 9 examined. In the simplest case this would be the number of "click-throughs" which  
 10 resulted from the advertisement. That is, the number of times a viewer clicked on the  
 11 advertisement in order to be linked to the advertiser's web site. The actual number of  
 12 click-throughs is adjusted to take into account the fact that not each appropriate view-op  
 13 was selected in step 327. For example, if:

- 14 (a) the advertisement was displayed one hundred times on a particular site and
- 15 five click throughs resulted,
- 16 (b) only fifty percent of the view-ops had been selected for display of this
- 17 advertisement (that is, only fifty percent of the view-ops were selected in previous
- 18 steps 307 and 335),

19 then the relative goodness number would be "ten" for this site

20  
 21 Block 333 indicates that the selection or scheduling criteria for each site is set based  
 22 upon the goodness numbers calculated in step 331. The percentage of view-ops  
 23 scheduled for each site is scaled so that these values are in proportion to the "goodness"  
 24 numbers and so that the total number of placements desired by the advertiser will be  
 25 met if the situation were to remain stable at the present values. It must however be



1 While the invention has been shown and described with respect to a preferred  
2 embodiment thereof, the scope of the applicant's invention is limited only by the  
3 appended claims. Various changes in form and detail can be made without departing  
4 from the spirit and scope of the invention.